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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/574,513

11/21/2006

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EXAMINER

SMITH, CHAD

ART UNIT

PAPER NUMBER

2874

MAIL DATE

DELIVERY MODE

02/03/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/574,513	<b>Applicant(s)</b> ISHIBASHI ET AL.	
	<b>Examiner</b> Chad H. Smith	<b>Art Unit</b> 2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 16-51 is/are pending in the application.
- 4a) Of the above claim(s) 38-49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 25,27,28,32,33,36,50 and 51 is/are rejected.
- 7) ☒ Claim(s) 16-24,26,29-31,34,35,37 and 51 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments with respect to claims 15 – 37 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Objections***

Claim 16 is objected to because of the following informalities: “set core” should read "said core" and the word semiconductor is duplicated and should be removed at line 7. Appropriate correction is required.

### ***Allowable Subject Matter***

Claims 16 – 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, taken alone or in combination, fails to disclose or render obvious wherein the band gaps of the second set of semiconductor layers are greater than the band gaps of the core layer and the band gaps of the first set of semiconductor layers are greater than the band gaps of the second set of semiconductor layers.

Claims 26 and 29 – 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of

Art Unit: 2874

allowable subject matter: The prior art of record, taken alone or in combination, fails to disclose or render obvious wherein the impurity concentration is  $1 \times 10^{17} \text{ cm}^{-3}$  or greater for the p-type layer.

Claims 34, 35 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, taken alone or in combination, fails to disclose or render obvious wherein the impurity having the deep level is Fe.

Claim 51 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, taken alone or in combination, fails to disclose or render obvious wherein said p-type and said n-type layer are laminated together.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

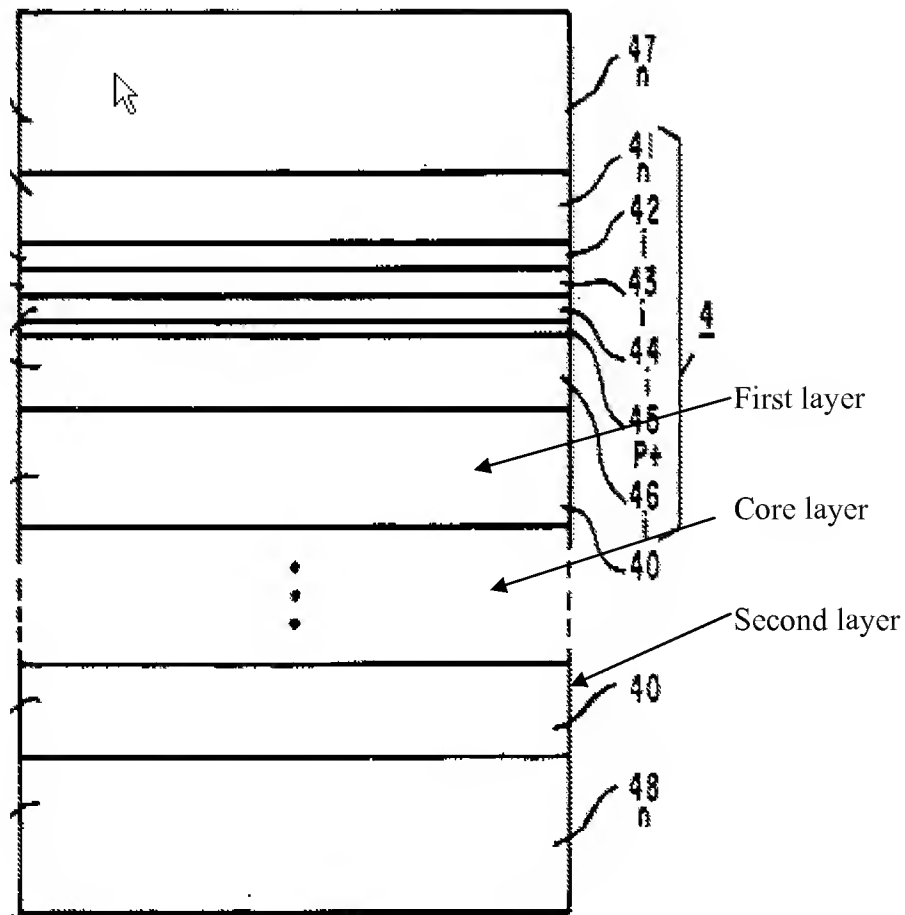
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2874

Claims 50 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Bar-Joseph et al. (U.S. Patent # 5,008,717).

In Re claim 50, '717 teaches a semiconductor optoelectronic waveguide comprising: a set of n-type electrode layers having an upper n-type electrode layer and a lower n-type electrode layer (10 and 14); a semiconductor core layer arranged between said n-type electrode layers, the semiconductor core layer having electro-optical effects when a voltage is supplied between said n-type electrode layers, the electro-optical effects being used to modulate an optical signal; a first set of semiconductor layers having a first layer arranged between said upper n-type electrode layer and said core layer and a second layer arranged between said lower n-type electrode layer and said core layer; and a pn junction including: a p-type layer arranged between said upper n-type electrode layer and said first layer; and an n-type layer arranged between said upper n-type electrode layer and said p-type layer.

Art Unit: 2874



In Re claim 25, '717 teaches wherein an impurity concentration of said pn junction layer is controlled such that under an operating state of the semiconductor optoelectronic waveguide, the p-type layer is depleted in a whole range while the n-type layer is at least partially depleted (col. 4, lines 50 – 56). Furthermore, the reference suggests to one of ordinary skill in the art that the depletion zone would extend into the n-type layer.

Art Unit: 2874

In Re claim 27, '717 teaches wherein an impurity forming a deep level is doped on the n-type layer (col. 4, lines 18 – 22).

In Re claim 28, '717 teaches wherein a band gap energy of the n-type layer is smaller than a band gap energy of the p-type layer (fig. 5).

In Re claim 32, '717 teaches wherein an impurity forming a deep level is doped on the n-type layer (col. 4, lines 18 – 22).

In Re claims 33 and 36, '717 teaches wherein a band gap energy of the n-type layer is smaller than a band gap energy of the p-type layer (fig. 5).

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

Art Unit: 2874

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chad H. Smith whose telephone number is (571) 270-1294. The examiner can normally be reached on Monday-Thursday 7:00 am - 4:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Uyen-Chau Le can be reached on 571-272-2397. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Chad H Smith/  
Examiner, Art Unit 2874

/Sung H. Pak/  
Primary Examiner, Art Unit 2874